

Appl. No. 09/531,135
Amdt. Dated May 1, 2006
Reply to Office Action of February 1, 2006

Attorney Docket No. 81784.0027
Customer No. 26021

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended): A solid-state image pickup apparatus comprising:
 - a solid-state image pickup device in which a first light receiving pixel is disposed in a plurality of lines in one-line units, and a second light receiving pixel capable of being driven independently from said first light receiving pixel is disposed in at least one-line units between first light receiving pixels of the plurality of lines;
 - a drive circuit for driving the first and second light receiving pixels of said solid-state image pickup device and accumulating information charges at mutually different times between first light receiving pixel and second light receiving pixel, as well as transferring and outputting information charges accumulated in said first and second light receiving pixels independently of each other;
 - a timing control circuit, connected to the drive circuit, for respectively setting the storage time of information charges at the first light receiving pixel and the storage time of information charges at the second light receiving pixel of said solid-state image pickup device; and
 - a signal processing circuit for generating an image signal by adding a first output corresponding to the first light receiving pixel and a second output corresponding to the second light receiving pixel of said solid-state image pickup device;

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wherein after driving the first and second light receiving pixels to accumulate information charges in the first and second light receiving pixels, the drive circuit adds information charges accumulated in the first light receiving pixel and information charges accumulated in the second light receiving pixel, and, the drive circuit drives the first and second light receiving pixels to further accumulate information charges in the first and second light receiving pixels and further adds information charges accumulated in the first light receiving pixels and the added information charges.

2. (Previously Presented): A solid-state image pickup apparatus comprising:

a solid-state image pickup device in which a first light receiving pixel is disposed in a plurality of lines in one-line units, and a second light receiving pixel capable of being driven independently from said first light receiving pixel is disposed in at least one-line units between first light receiving pixels of the plurality of lines;

a drive circuit for driving the first and second light receiving pixels of said solid-state image pickup device and accumulating information charges at mutually different times between first light receiving pixel and second light receiving pixel, as well as transferring and outputting information charges accumulated in said first and second light receiving pixels independently of each other;

a timing control circuit for respectively setting the storage time of information charges at the first light receiving pixel and the storage time of information charges at the second light receiving pixel of said solid-state image pickup device; and

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a signal processing circuit for generating an image signal by adding a first output corresponding to the first light receiving pixel and a second output corresponding to the second light receiving pixel of said solid-state image pickup device;

wherein said signal processing circuit calculates vertical transfer smear component on the basis of a ratio of said respective accumulation times of information charges at said first and second light receiving pixels of said solid-state image pickup device and of a difference of said first and second outputs corresponding to said first and second light receiving pixels of said solid-state image pickup device.

3. (Original): The solid-state image pickup apparatus according to claim 2 wherein said signal processing circuit subtracts said vertical transfer smear component from said image signal on the basis of a ratio of said respective accumulation times of information charges at said first and second light receiving pixels of said solid-state image pickup device and of a difference of said first and second outputs corresponding to said first and second light receiving pixels of said solid-state image pickup device.

4. (Previously Presented): The solid-state image pickup apparatus comprising:

the solid-state image pickup device having a line of first light receiving pixels and a line of second light receiving pixels disposed so as to respectively correspond to horizontal scanning lines and capable of driving independently of each other said first light receiving pixels and said second light receiving pixels;

the drive circuit for driving said first and second light receiving pixels so that accumulation of information charges is performed at different times between said first light receiving pixels and said second light receiving pixels, as well as

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transferring and outputting independently of each other said information charges accumulated in said first and second light receiving pixels and generating the first output according to said information charges accumulated in said first light receiving pixels and the second output according to said information charges accumulated in said second light receiving pixels; and

the signal processing circuit for performing calculation of a smear quantity generated during vertical transfer of said information charges at said solid-state image pickup device on the basis of a ratio of said respective accumulation times of said information charges at said first and second light receiving pixels and of said first output and said second output.

5. (Original): The solid-state image pickup apparatus according to claim 4 wherein said signal processing circuit performs calculation of said smear quantity for every pair of said first light receiving pixel and said second light receiving pixel disposed so as to be in mutual proximity on same vertical transfer path.

6. (Original): The solid-state image pickup apparatus according to claim 4 wherein said signal processing circuit removes smear component included in at least said first output or said second output on the basis of said smear quantity of said calculation.

7. (Currently Amended): A solid-state image pickup apparatus comprising:

a solid-state image pickup device having a line of first light receiving pixels and a line of second light receiving pixels disposed so as to respectively correspond to horizontal scanning lines and capable of driving independently of each other said first light receiving pixels and said second light receiving pixels;

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a drive circuit, connected to the solid-state image pickup device, for driving said first and second light receiving pixels so that accumulation of information charges is performed at different times between said first light receiving pixels and said second light receiving pixels, as well as transferring and outputting independently of each other said information charges accumulated in said first and second light receiving pixels and generating the first output according to said information charges accumulated in said first light receiving pixels and the second output according to said information charges accumulated in said second light receiving pixels; and

a signal processing circuit for generating an image signal by adding together said first output and said second output corresponding to identical horizontal scanning lines;

wherein after driving the first and second light receiving pixels to accumulate information charges in the first and second light receiving pixels, the drive circuit adds information charges accumulated in the first light receiving pixel and information charges accumulated in the second light receiving pixel, and, the drive circuit drives the first and second light receiving pixels to further accumulate information charges in the first and second light receiving pixels and further adds information charges accumulated in the first light receiving pixels and the added information charges.

8. (Previously Presented): A solid-state image pickup apparatus comprising:

a solid-state image pickup device having a line of first light receiving pixels and a line of second light receiving pixels disposed so as to respectively correspond to horizontal scanning lines and capable of driving independently of each other said first light receiving pixels and said second light receiving pixels;

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a drive circuit for driving said first and second light receiving pixels so that accumulation of information charges is performed at different times between said first light receiving pixels and said second light receiving pixels, as well as transferring and outputting independently of each other said information charges accumulated in said first and second light receiving pixels and generating the first output according to said information charges accumulated in said first light receiving pixels and the second output according to said information charges accumulated in said second light receiving pixels; and

a signal processing circuit for generating an image signal by adding together said first output and said second output corresponding to identical horizontal scanning lines;

wherein said signal processing circuit performs calculation of smear quantity generated during vertical transfer of said information charges at said solid-state image pickup device on the basis of a ratio of said respective accumulation times of said information charges at said first and second light receiving pixels and of said first output and said second output.

9. (Original): The solid-state image pickup apparatus according to claim 8 wherein said signal processing circuit performs calculation of said smear quantity for every pair of said first light receiving pixel and said second light receiving pixel disposed so as to be in mutual proximity on same vertical transfer path.

10. (Original): The solid-state image pickup apparatus according to claim 8 wherein said signal processing circuit removes smear component included in said image signal on the basis of said smear quantity of said calculation.

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11. (Currently Amended): A solid-state image pickup apparatus, comprising:

a solid-state image pickup device in which a first light receiving pixel is disposed in a plurality of lines in one-line units, and a second light receiving pixel capable of being driven independently from said first light receiving pixel is disposed in at least one-line units between first light receiving pixels of the plurality of lines;

a drive circuit for driving the first and second light receiving pixels of said solid-state image pickup device and accumulating information charges at mutually different times between the first light receiving pixel and the second light receiving pixel; and

a timing control circuit, connected to the drive circuit, for respectively setting the storage time of information charges at the first light receiving pixel and the storage time of information charges at the second light receiving pixel of said solid-state image pickup device; wherein

after driving the first and second light receiving pixels to accumulate information charges in the first and second light receiving pixels, the drive circuit adds information charges accumulated in the first light receiving pixel and information charges accumulated in the second light receiving pixel, and, the drive circuit drives the first and second light receiving pixels to further accumulate information charges in the first and second light receiving pixels and further adds information charges accumulated in the first light receiving pixels and the added information charges.